# CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

**NABL** - Accredited Laboratory as per ISO / IEC-17025 :2005

T-2377


Job No.: CTCE/BBMP/W.No11/BBU/CSR-05/053b/CEMENT/2016-17 Date: 01.06.2016

## TEST REPORT ON CEMENT

| | | |
|---|---|---|
| * CUSTOMER | : | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| *AGENCY | : | **Mr. B.B. Umesh,** # 385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore - 57. |
| *NAME OF THE WORK | : | Improvements to roads and drains at Singapura Paradise & surrounding roads in Ward No. 11, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| REFERENCE | : | BBMP/EE/BTP/WO/41/2016-17 Dated: 26.05.2016 |
| SAMPLE ID | : | Cement |
| SAMPLE RECEIVED ON | : | 31.05.2016 |
| PERIOD OF TESTING | : | 31.05.2016 to 01.06.2016 |

The results of the tests conducted on the cement sample are as follows:

| Sl. No | Descriptions | Test Method as per IS | Test Result | Requirements as per IS: 8112-2013 |
|---|---|---|---|---|
| 1 | Standard Consistency | IS-4031 (Part -4) 1988(RA-2009) | 28.00 % | - |
| 2 | a) Initial Setting Time | IS-4031 (Part -5) 1988(RA-2009) | 135 Minutes | Not Less than 30 Minutes |
| | b) Final Setting Time | IS-4031 (Part -5) 1988(RA-2009) | 450 Minutes | Not More than 600 Minutes |
| 3 | Soundness by Le Chartlier Method | IS-4031 (Part-3) 1988(RA-2009) | 1 mm | Not more than 10mm |

*Information is furnished by the Customer/Representative.

Note:

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⇒ The results indicated above are based on the tests carried out on the samples received in the laboratory.

⇒ Any Query regarding the report must be reported within 30 days from the date of testing.

*********

VISHWANATH. I.A.
Chief Executive Officer


#23/14, 7th Cross, 3rd Stage, 4th Block, Shakthi Ganapathi Nagara, Basaveshwaranagar, Bangalore-79.
Tele Fax : 23223227, Website : www.civiltechconsultants.com
E-mail : vishwanath.ia@civiltechconsultants.com / info@civiltechconsultants.com

# CIVIL-TECH CONSULTANTS AND ENGINEERS

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**NABL** - Accredited Laboratory as per ISO / IEC-17025 :2005

T-2377


Job No.: CTCE/BBMP/W.No11/BBU/CSR-05/053b/SAND-Gradation/2016-17 : 01.06.2016

## TEST REPORT ON DETERMINATION GRADATION OF FINE AGGREGATES

* Customer : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

* Agency : **Mr. B.B. Umesh,**
# 385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore - 57.

* Name of Work : Improvements to roads and drains at Singapura Paradise & surrounding roads in War No. 11, Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : BBMP/EE/BTP/WO/41/2016-17 Dated: 26.05.2016

Technical Reference : IS : 2386 Part 1 - 1963 RA-2007

Sample ID : Fine Aggregates

Sample Received on : 31.05.2016

Date of Testing : 01.06.2016

Total Wt. of Aggregates in gms **1000**

| Is Sieve Size in mm | Cumulative Weight Passing in % | Spec.Limits as per IS 383-1970 (RA- 2007) | | | |
|---|---|---|---|---|---|
| | | Zone-I | Zone-II | Zone-III | Zone-IV |
| 10 | 100 | 100 | 100 | 100 | 100 |
| 4.75 | 92.90 | 90-100 | 90-100 | 90-100 | 95-100 |
| 2.36 | 76.50 | 60-95 | 75-100 | 85-100 | 95-100 |
| 1.18 | 48.70 | 30-70 | 55-90 | 75-100 | 90-100 |
| 600 Micron | 22.80 | 15-34 | 35-59 | 60-79 | 80-100 |
| 300 Micron | 11.30 | 5-20 | 8-30 | 12-40 | 15-50 |
| 150 Micron | 5.70 | 0-10 | 0-10 | 0-10 | 0-15 |

* Information is furnished by the Customer/Representative

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**Remarks :** This sample is under Zone-I specific limits.

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# CIVIL-TECH CONSULTANTS AND ENGINEERS

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JAS-ANZ BSCIC ISO 9001 REGISTERED


Job No.: CTCE/BBMP/W.No11/BBU/WMM/Gradation/2016-17 02.06.2016

## GRADATION FOR WMM
## MORTH TABLE-400-11

**Client** : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

**Agency** : **Mr. B.B. Umesh,**
# 385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore - 57.

**Name of Work** : Improvements to roads and drains at Singapura Paradise & surrounding roads in Ward No 11, Vidyaranyapura Sub Division, BBMP, Bangalore.

**Reference** : BBMP/EE/BTP/WO/41/2016-17 Dated: 26.05.2016

Date of Testing : 02.06.2016

Material : WMM

Sample ID : WMM Layer Oven Dry Wt (gm): **7515**

| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---|---|---|---|---|---|
| 53 | 0 | 0 | 0 | 100 | 100 |
| 45 | 265 | 265 | 3.5 | 96.5 | 95-100 |
| 22.4 | 2505 | 2770 | 36.9 | 63.1 | 60-80 |
| 11.2 | 1215 | 3985 | 53.0 | 47.0 | 40-60 |
| 4.75 | 925 | 4910 | 65.3 | 34.7 | 25-40 |
| 2.36 | 875 | 5785 | 77.0 | 23.0 | 15-30 |
| 0.600 | 785 | 6570 | 87.4 | 12.6 | 8-22 |
| 0.075 | 565 | 7135 | 94.9 | 5.1 | 0-8 |

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4th Block, Shakthiganapathinagara,
Basaveshwaranagar,
Bangalore-560079.

# CIVIL-TECH CONSULTANTS AND ENGINEERS

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Job No.: CTCE/BBMP/W.No11/BBU/WMM/Gradation/2016-17 03.06.2016

## GRADATION FOR WMM
## MORTH TABLE-400-11

**Client** : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

**Agency** : **Mr. B.B. Umesh,**
# 385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore - 57.

**Name of Work** : Improvements to roads and drains at Singapura Paradise & surrounding roads in Ward No. 11, Vidyaranyapura Sub Division, BBMP, Bangalore.

**Reference** : BBMP/EE/BTP/WO/41/2016-17 Dated: 26.05.2016

Date of Testing : 03.06.2016

Material : WMM

Sample ID : WMM Layer Oven Dry Wt (gm): **8200**

| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---|---|---|---|---|---|
| 53 | 0 | 0 | 0 | 100 | 100 |
| 45 | 310 | 310 | 3.8 | 96.2 | 95-100 |
| 22.4 | 2650 | 2960 | 36.1 | 63.9 | 60-80 |
| 11.2 | 1410 | 4370 | 53.3 | 46.7 | 40-60 |
| 4.75 | 1165 | 5535 | 67.5 | 32.5 | 25-40 |
| 2.36 | 955 | 6490 | 79.1 | 20.9 | 15-30 |
| 0.600 | 785 | 7275 | 88.7 | 11.3 | 8-22 |
| 0.075 | 655 | 7930 | 96.7 | 3.3 | 0-8 |

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Basaveshwaranagar,
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# CIVIL-TECH CONSULTANTS AND ENGINEERS

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Job No.: CTCE/BBMP/W.No11/BBU/WMM/Gradation/2016-17 06.06.2016

## GRADATION FOR WMM
## MORTH TABLE-400-11

**Client** : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

**Agency** : **Mr. B.B. Umesh,**
# 385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore - 57.

**Name of Work** : Improvements to roads and drains at Singapura Paradise & surrounding roads in Ward No 11, Vidyaranyapura Sub Division, BBMP, Bangalore.

**Reference** : BBMP/EE/BTP/WO/41/2016-17 Dated: 26.05.2016

Date of Testing : 06.06.2016

Material : WMM

Sample ID : WMM Layer

Oven Dry Wt (gm): **7870**

| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---|---|---|---|---|---|
| 53 | 0 | 0 | 0 | 100 | 100 |
| 45 | 265 | 265 | 3.4 | 96.6 | 95-100 |
| 22.4 | 2455 | 2720 | 34.6 | 65.4 | 60-80 |
| 11.2 | 1350 | 4070 | 51.7 | 48.3 | 40-60 |
| 4.75 | 1210 | 5280 | 67.1 | 32.9 | 25-40 |
| 2.36 | 800 | 6080 | 77.3 | 22.7 | 15-30 |
| 0.600 | 710 | 6790 | 86.3 | 13.7 | 8-22 |
| 0.075 | 595 | 7385 | 93.8 | 6.2 | 0-8 |

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Basaveshwaranagar,
Bangalore-560079.

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Job No.: CTCE/BBMP/W.No11/BBU/WMM/Gradation/2016-17 07.06.201

## GRADATION FOR WMM
## MORTH TABLE-400-11

**Client** : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

**Agency** : **Mr. B.B. Umesh,**
# 385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore - 57.

**Name of Work** : Improvements to roads and drains at Singapura Paradise & surrounding roads in Ward No. 11, Vidyaranyapura Sub Division, BBMP, Bangalore.

**Reference** : BBMP/EE/BTP/WO/41/2016-17 Dated: 26.05.2016

Date of Testing : 07.06.2016

Material : WMM

Sample ID : WMM Layer

Oven Dry Wt (gm): **7830**

| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---|---|---|---|---|---|
| 53 | 0 | 0 | 0 | 100 | 100 |
| 45 | 180 | 180 | 2.3 | 97.7 | 95-100 |
| 22.4 | 2685 | 2865 | 36.6 | 63.4 | 60-80 |
| 11.2 | 1350 | 4215 | 53.8 | 46.2 | 40-60 |
| 4.75 | 1020 | 5235 | 66.9 | 33.1 | 25-40 |
| 2.36 | 900 | 6135 | 78.4 | 21.6 | 15-30 |
| 0.600 | 750 | 6885 | 87.9 | 12.1 | 8-22 |
| 0.075 | 600 | 7485 | 95.6 | 4.4 | 0-8 |

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# CIVIL-TECH CONSULTANTS AND ENGINEERS

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Job No.: CTCE/BBMP/W.No11/BBU/WMM/Gradation/2016-17 08.06.2016

## GRADATION FOR WMM
## MORTH TABLE-400-11

**Client** : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

**Agency** : **Mr. B.B. Umesh,**
# 385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore - 57.

**Name of Work** : Improvements to roads and drains at Singapura Paradise & surrounding roads in Ward No. 11, Vidyaranyapura Sub Division, BBMP, Bangalore.

**Reference** : BBMP/EE/BTP/WO/41/2016-17 Dated: 26.05.2016

Date of Testing : 08.06.2016

Material : WMM

Sample ID : WMM Layer

Oven Dry Wt (gm): **7320**

| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---|---|---|---|---|---|
| 53 | 0 | 0 | 0 | 100 | 100 |
| 45 | 155 | 155 | 2.1 | 97.9 | 95-100 |
| 22.4 | 2650 | 2805 | 38.3 | 61.7 | 60-80 |
| 11.2 | 1185 | 3990 | 54.5 | 45.5 | 40-60 |
| 4.75 | 955 | 4945 | 67.6 | 32.4 | 25-40 |
| 2.36 | 800 | 5745 | 78.5 | 21.5 | 15-30 |
| 0.600 | 750 | 6495 | 88.7 | 11.3 | 8-22 |
| 0.075 | 555 | 7050 | 96.3 | 3.7 | 0-8 |

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Job No.: CTCE/BBMP/W.No11/BBU/WMM/AIV/2016-17 02.06.2016

## Aggregate Impact Value

IS: 2386 Part IV

| | |
|---|---|
| **Client** | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Agency** | **Mr. B.B. Umesh,** # 385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore - 57. |
| **Name of the Work** | Improvements to roads and drains at Singapura Paradise & surrounding roads in Ward No. 11, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| **Reference** | BBMP/EE/BTP/WO/41/2016-17 Dated: 26.05.2016 |
| **Sample ID** | WMM Layer |
| **Type of Mix** | Wet Mix macadam |
| **Date of Testing** | 02.06.2016 |

| Sl No. | Details | Trial No. 1 | Trial No. 2 | Average |
|---|---|---|---|---|
| 1 | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 381 | 384 | |
| 2 | Weight of agregate passing 2.36 mm sieve after the test = $W_2$ g | 82 | 85 | |
| 3 | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g | 299 | 299 | |
| 4 | Aggregate Impact value = percent fines | 21.52 | 22.14 | |
| | 100* ($W_2/W_1$)% | | | 21.83 |

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

Note:

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Job No.: CTCE/BBMP/W.No11/BBU/WMM/S-T/2016-17 02.06.2016

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

| | |
|---|---|
| Client | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Agency | **Mr. B.B. Umesh,**<br># 385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore - 57. |
| Name of Work | Improvements to roads and drains at Singapura Paradise & surrounding roads in Ward No. 11, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Reference | BBMP/EE/BTP/WO/41/2016-17 Dated: 26.05.2016 |
| Technical Reference | IS 2386(Part 1) 1963 (RA 2011) |
| Type of Mix | Wet Mix Macadam |
| Sample ID | WMM Layer |
| Date of Testing | 02.06.2016 |

Civil-Tech Consultants & Engineers Bangalore

Result : Flakiness Index = **11.56%**

Elongation Index = **13.28%**

**Result : Combined Flakiness & Elongation index** **24.84%**

**Comments:**

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

**Note:**

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Job No.: CTCE/BBMP/W.No11/BBU/SDBC/AIV/2016-17 11.07.2016

## Aggregate Impact Value

IS: 2386 Part IV

| | |
|---|---|
| Client | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Agency | **Mr. B.B. Umesh,** # 385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore - 57. |
| Name of the Work | Improvements to roads and drains at Singapura Paradise & surrounding roads in Ward No. 11, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Reference | BBMP/EE/BTP/WO/41/2016-17 Dated: 26.05.2016 |
| Source / Location | Hot Mix Plant, Bangalore |
| Type of Mix | Semi Dense Bituminous Concrete |
| Date of Testing | 11.07.2016 |

| Sl No. | Details | Trial No. 1 | Trial No. 2 | Average |
|---|---|---|---|---|
| 1 | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 383 | 386 | |
| 2 | Weight of agregate passing 2.36 mm sieve after the test = $W_2$ g | 84 | 87 | |
| 3 | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g | 299 | 299 | |
| 4 | Aggregate Impact value = percent fines<br>$100^* (W_2/W_1)\%$ | 21.93 | 22.54 | 22.24 |

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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# CIVIL-TECH CONSULTANTS AND ENGINEERS

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Job No.: CTCE/BBMP/W.No11/BBU/SDBC/Shape_T/2016-17 11.07.2016

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

| | |
|---|---|
| Client | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Agency | **Mr. B.B. Umesh,** # 385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore - 57. |
| Name of Work | Improvements to roads and drains at Singapura Paradise & surrounding roads in Ward No. 11, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Reference | BBMP/EE/BTP/WO/41/2016-17 Dated: 26.05.2016 |
| Technical Reference | IS 2386(Part 1) 1963 (RA 2007) |
| Type of Mix | Semi Dense Bituminous Concrete |
| Date of Testing | 11.07.2016 |

Civil-Tech Consultants & Engineers ★ Bangalore

Result : Flakiness Index = **11.72%**

Elongation Index = **13.59%**

Result : Combined Flakiness & Elongation index **25.31%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No11/BBU/SDBC/Stripping/2016-17 11.07.2016

## Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

| | |
|---|---|
| Client | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Agency | **Mr. B.B. Umesh,** # 385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore - 57. |
| Name of the work | Improvements to roads and drains at Singapura Paradise & surrounding roads in Ward No. 11, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Reference | BBMP/EE/BTP/WO/41/2016-17 Dated: 26.05.2016 |
| Type of Mix | Semi Dense Bituminous Concrete |
| Date of Testing | 11.07.2016 |

Type of binder : 60/70

Percentage of binder used : 5.0% by wt.

Total weight of aggregate : 200 g

Total weight of binder : 10.0 g

Temperature of water-bath : 40° C

| Observation Number | Stripping, Percentage | Average, Percentage | Average Retained Coating, % |
|---|---|---|---|
| 1 | 2.8 | 2.93 | 97.07 |
| 2 | 2.9 | | |
| 3 | 3.1 | | |

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

Note:

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Job No.: CTCE/BBMP/W.No11/BBU/SDBC/Sp_Wa/2016-17 11.07.2016

## Specific Gravity And Water Absorption Test

IS: 2386 Part III

| | |
|---|---|
| Client | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Agency | **Mr. B.B. Umesh,** # 385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore - 57. |
| Name of the Work | Improvements to roads and drains at Singapura Paradise & surrounding roads in Ward No. 11, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| Reference | BBMP/EE/BTP/WO/41/2016-17 Dated: 26.05.2016 |
| Type of Mix | Semi Dense Bituminous Concrete |
| Source / Location | Hotmix Plant, Bangalore |
| Date of Testing | 11.07.2016 |

| Sl. No. | Details | Notation | Test Number | | | Mean Value |
|---|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | Test 3 | |
| 1 | Weight of aggregate suspended in water with the basket | $W_1$ g | 2022 | 2025 | 2028 | |
| 2 | Weight of basket suspended in water | $W_2$ g | 750 | 750 | 750 | |
| 3 | Weight of saturated aggregate in water | $(W_1 - W_2) = W_S$ g | 1272 | 1275 | 1278 | |
| 4 | Weight of saturated surface dry aggregate in air | $W_3$ g | 2042 | 2044 | 2047 | |
| 5 | Weight of water equal to the volume of the aggregate | $(W_3 - W_S)$ g | 770 | 769 | 769 | |
| 6 | Weight of oven dried aggregate | $W_4$ g | 2026 | 2029 | 2034 | |
| 7 | Specific Gravity | $W_4/(W_3-W_S)$ | 2.631 | 2.638 | 2.645 | 2.638 |
| 8 | Apparent Specific gravity | $W_4/(W_4-W_S)$ | 2.687 | 2.691 | 2.690 | 2.689 |
| 9 | Water Absorption | $((W_3-W_4)*100)/W_4$ | 0.79% | 0.74% | 0.64% | 0.72% |

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2[illegible]

Note:

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Þ Any Query regarding the report must be reported within 30 days from the date of testing

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# 23/14, 7th Cross, 3rd Stage,
4th Block, Shakthiganapathinagara,
Basaveshwaranagar,
Bangalore-560079.

# CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

An ISO 9001:2008 Certified Company

**NABL** - Accredited Laboratory as per ISO / IEC-17025 : 2005

JAS-ANZ BSCIC ISO 9001 REGISTERED


Job No.: CTCE/BBMP/W.No11/BBU/SDBC/Bitumen/2016-17 11.07.2016

## BITUMEN DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

**AS per IRC : SP : 11 - 1984**

| | |
|---|---|
| CLIENT | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| AGENCY | **Mr. B.B. Umesh,** # 385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore - 57. |
| NAME OF THE WORK | Improvements to roads and drains at Singapura Paradise & surrounding roads in Ward No. 11, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| REFERENCE | BBMP/EE/BTP/WO/41/2016-17 Dated: 26.05.2016 |
| SAMPLE I/D | Roads in Singapura Paradise & surrounding roads in Ward No. 11 |
| DATE OF TESTING | 11.07.2016 |

### BITUMEN CONTENT DETERMINATION

| Description | Trail 1 | Trail 2 |
|---|---|---|
| 1. Weight of Mixture before Test, g | 500 | 500 |
| 2. Weight of Mixture after Test, g | 474 | 475 |
| 3. Weight of Asphalt and Mineral matter Extracted, g | - | - |
| 4. Weight of Mineral Matter, g. | - | - |
| 5. Weight of Ash, g | | |
| 6. Weight of Bitumen Extracted, g. (corrected) | 26 | 25.00 |
| 7. Bitumen content in % | 5.20 | 5.00 |
| 8. Average | | 5.10 |

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## GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

**As per IS : 2386 and IRC : SP : 11 - 1984**

| | |
|---|---|
| CLIENT | **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore. |
| AGENCY | **Mr. B.B. Umesh,** # 385/1, Near Anjaneya Temple, Bettahalasur Village & (P), Bangalore - 57. |
| NAME OF THE WORK | Improvements to roads and drains at Singapura Paradise & surrounding roads in Ward No. 11, Vidyaranyapura Sub Division, BBMP, Bangalore. |
| REFERENCE | BBMP/EE/BTP/WO/41/2016-17 Dated: 26.05.2016 |
| SAMPLE I/D | Roads in Singapura Paradise & surrounding roads in Ward No. 11 |
| DATE OF TESTING | 11.07.2016 |

### GRADATION AFTER EXTRACTION

| Sieve Size in mm | Trail 1 | | | | Specified Limits as per MORTH specification table 500-15 (Grading-2) |
|---|---|---|---|---|---|
| | Weight Retained, gm | % Retained | %Cummulative Retained | % Passing | |
| 13.2 | 0 | 0 | 0 | 100 | 100 |
| 9.5 | 26.25 | 5.54 | 5.54 | 94.46 | 90-100 |
| 4.75 | 251.48 | 53.05 | 58.59 | 41.41 | 35-51 |
| 2.36 | 53.64 | 11.32 | 69.91 | 30.09 | 24-39 |
| 1.18 | 52.87 | 11.15 | 81.06 | 18.94 | 15-30 |
| 0.3 | 29.68 | 6.26 | 87.32 | 12.68 | 9-19 |
| 0.075 | 35.48 | 7.49 | 94.81 | 5.19 | 3-8 |

| Sieve Size in mm | Trail 2 | | | | Specified Limits as per MORTH specification table 500-15 (Grading-2) |
|---|---|---|---|---|---|
| | Weight Retained, gm | % Retained | %Cummulative Retained | % Passing | |
| 13.2 | 0 | 0 | 0 | 100 | 100 |
| 9.5 | 33.65 | 7.08 | 7.08 | 92.92 | 90-100 |
| 4.75 | 258.74 | 54.47 | 61.56 | 38.44 | 35-51 |
| 2.36 | 55.63 | 11.71 | 73.27 | 26.73 | 24-39 |
| 1.18 | 43.65 | 9.19 | 82.46 | 17.54 | 15-30 |
| 0.3 | 26.87 | 5.66 | 88.11 | 11.89 | 9-19 |
| 0.075 | 34.85 | 7.34 | 95.45 | 4.55 | 3-8 |

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#23/14, 7th Cross, 3rd Stage, 4th Block, Shakthi Ganapathi Nagara, Basaveshwaranagar, Bangalore-79.

Tele Fax : 23223227, Website : www.civiltechconsultants.com

E-mail : vishwanath.ia@civiltechconsultants.com / info@civiltechconsultants.com